

Accident & Repair - Body **(Syllabus content)**

Assessment Requirements

Unit G01/02K – Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment

Content:

Economic use of Resources

- a. consumable materials e.g. grease, oils, split pins, locking and fastening devices etc.

Requirement to maintain work area effectively

- a. cleaning tools and equipment to maximise workplace efficiency.
- b. requirement to carry out the housekeeping activities safely and in a way that minimises inconvenience to customers and staff.
- c. risks involved when using solvents and detergents.
- d. advantages of good housekeeping.

Spillages, leaks and waste materials

- a. relevance of safe systems of work to the storage and disposal of waste materials.
- b. requirement to store and dispose of waste, used materials and debris correctly.
- c. safe disposal of special / hazardous waste materials.
- d. advantages of recycling waste materials.
- e. dealing with spillages and leaks

Basic legislative requirements

- a. Provision and Use of Work Equipment Regulations 1992.
- b. Power Presses Regulations 1992.
- c. Pressure Systems and Transportable Gas Containers Regulations 1989.
- d. Electricity at Work Regulations 1989.
- e. Noise at Work Regulations 1989.
- f. Manual Handling Operations Regulations 1992.
- g. Health and Safety (Display Screen Equipment) Regulations 1992.
- h. Abrasive Wheel Regulations.
- i. Safe Working Loads.
- j. Working at Height Regulations (date)

Routine maintenance of the workplace

- a. Trainees personal responsibilities and limits of their authority with regard to work equipment.
- b. Risk assessment of the workplace activities and work equipment.
- c. Workplace person responsible for training and maintenance of workplace equipment.
- d. When and why safety equipment must be used.
- e. Location of safety equipment.
- f. Particular hazards associated with their work area and equipment.
- g. Prohibited areas.
- h. Plant and machinery that trainees must **not** use or operate.
- i. Why and how faults on unsafe equipment should be reported.
- j. Storing tools, equipment and products safely and appropriately.
- k. Using the correct PPE.
- l. Following manufacturers' recommendations.

- m. Location of routine maintenance information e.g. electrical safety check log.

Legislation relevant to Health and Safety

- i. HASAWA
- ii. COSHH
- iii. EPA
- iv. Manual Handling Operations Regulations 1992
- v. PPE Regulations 1992

General regulations to include an awareness of:

- i. Health and Safety (Display Screen Equipment) Regulations 1992
- ii. Health and Safety (First Aid) Regulations 1981
- iii. Health and Safety (Safety Signs and Signals) Regulations 1996
- iv. Health and Safety (Consultation with Employees) Regulations 1996
- v. Employers Liability (Compulsory Insurance) Act 1969 and Regulations 1998
- vi. Confined Spaces Regulations 1997
- vii. Noise at Work Regulations 1989
- viii. Electricity at Work Regulations 1989
- ix. Electricity (Safety) Regulations 1994
- x. Fire Precautions Act 1971
- xi. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985
- xii. Pressure Systems Safety Regulations 2000
- xiii. Waste Management 1991
- xiv. Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002
- xv. Control of Asbestos at Work Regulations 2002

Legislative duties

- a. The purpose of a Health and Safety Policy.
- b. The relevance of the Health and Safety Executive.
- c. The relevance of an initial induction to Health and Safety requirements at your workplace.
- d. General employee responsibilities under the HASAWA and the consequences of non-compliance.
- e. General employer responsibilities under the HASAWA and the consequences of non-compliance.
- f. The limits of authority with regard to Health and Safety within a personal job role.
- g. Workplace procedure to be followed to report Health and Safety matters.

Precautions to be taken when working with vehicles, workshop materials, tools and equipment including electrical safety, pneumatics and hydraulics

- a. Accessing and interpreting safety information
- b. Seeking advice when needed
- c. Seeking assistance when required
- d. Reporting of unsafe equipment
- e. Storing tools, equipment and products safely and appropriately
- f. Using the correct PPE
- g. Following manufacturers recommendations
- h. Following application procedures e.g. hazardous substances
- i. The correct selection and use of extraction equipment

PPE to include:

- a. Typical maintenance procedures for PPE equipment to include:
 - i. typical maintenance log
 - ii. cleaning procedures
 - iii. filter maintenance
 - iv. variation in glove types

- v. air quality checks
- b Choice and fitting procedures for masks and air breathing equipment.
- c. Typical workplace processes which would require the use of PPE to include:
 - i. welding
 - ii. sanding and grinding
 - iii. filling
 - iv. panel removal and replacement
 - v. drilling
 - vi. cutting
 - vii. chiselling
 - viii. removal of broken glass
 - ix. removal of rubber seals from fire damaged vehicles
 - x. removal of hypodermic needles
 - xi. servicing activities
 - xii. roadside recovery
- d. Unserviceable PPE.
- e. PPE required for a range automotive repair activities. To include appropriate protection of:
 - i. eyes
 - ii. ears
 - iii. head
 - iv. skin
 - v. feet
 - vi. hands
 - vii. lungs

Fire and extinguishers

- a. Classification of fire types
- b. Using a fire extinguisher effectively.
 - Types of Extinguishers
 - a. foam
 - b. dry powder
 - c. CO2
 - d. water
 - e. fire blanket

Action to be taken in the event of a fire to include:

- a. The procedure as:
 - i. raise the alarm
 - ii. fight fire only if appropriate
 - iii. evacuate building
 - iv. call for assistance

Product warning labels to include:

- a. Reasons for placing warning labels on containers.
- b. Warning labels in common use, to include:
 - i. toxic
 - ii. corrosive
 - iii. poisonous
 - iv. harmful
 - v. irritant
 - vi. flammable
 - vii. explosive

Warning signs and notices

- a. Colours used for warning signs:

- i. red
- ii. blue
- iii. green
- b. Shapes and meaning of warning signs:
 - i. round
 - ii. triangular
 - iii. square
- c. The meaning of prohibitive warning signs in common use.
- d. The meaning of mandatory warning signs in common use.
- e. The meaning of warning notices in common use.
- f. General design of safe place warning signs.

Hazards and risks to include:

- a. The difference between a risk and a hazard.
- b. Potential risks resulting from:
 - i. the use and maintenance of machinery or equipment
 - ii. the use of materials or substances
 - iii. accidental breakages and spillages
 - iv. unsafe behaviour
 - v. working practices that do not conform to laid down policies
 - vi. environmental factors
 - vii. personal presentation
 - viii. unauthorised personal, customers, contractors etc entering your work premises
 - ix. working by the roadside
 - x. vehicle recovery
- c. The employee's responsibilities in identifying and reporting risks within their working environment.
- d. The method of reporting risks that are outside your limits of authority.
- e. Potential causes of:
 - i. fire
 - ii. explosion
 - iii. noise
 - iv. harmful fumes
 - v. slips
 - vi. trips
 - vii falling objects
 - viii accidents whilst dealing with broken down vehicles

Personal responsibilities

- a. The purpose of workplace policies and procedures on:
 - i. the use of safe working methods and equipment
 - ii. the safe use of hazardous substances
 - iii. smoking, eating , drinking and drugs
 - iv. emergency procedures
 - v. personal appearance
- b. The importance of personal appearance in the control of health and safety.

Action to be taken in the event of colleagues suffering accidents

- a. The typical sequence of events following the discovery of an accident such as:
 - i. make the area safe
 - ii. remove hazards if appropriate i.e. switch off power
 - iii. administer minor first aid
 - iv. take appropriate action to re-assure the injured party
 - v. raise the alarm

- vi. get help
- vii. report on the accident

b Typical examples of first aid which can be administered by persons at the scene of an accident:

- i. check for consciousness
- ii. stem bleeding
- iii. keep the injured person's airways free
- iv. place in the recovery position if injured person is unconscious
- v. issue plasters for minor cuts
- vi. action to prevent shock i.e. keep the injured party warm
- vii. administer water for minor burns or chemical injuries
- viii. wash eyes with water to remove dust or ingress of chemicals (battery acid)
- ix. need to seek professional help for serious injuries

c Examples of bad practice which may result in further injury such as:

- i. moving the injured party
- ii. removing foreign objects from wounds or eyes
- iii. inducing vomiting
- iv. straightening deformed limbs

Assessment Requirements

Unit G3K – Knowledge of Support for Job Roles in the Automotive Environment

Content:

The structure of a typical vehicle repair business

- a. How these areas relate to each other within the business
 - i. body shop
 - ii. vehicle repair workshop
 - iii. paint shop
 - iv. valeting
 - v. vehicle parts store
 - vi. main office
 - vii. vehicle sales
 - viii. reception

- b. Sources of information
 - a. other staff
 - b. manuals
 - c. parts lists
 - d. computer software and the internet
 - d. manufacturer
 - e. diagnostic equipment

Communication requirements when carrying out vehicle repairs

- a. Locating and using correct documentation and information for:
 - i. recording vehicle maintenance and repairs
 - ii. vehicle specifications
 - iii. component specifications
 - iv. oil and fluid specifications
 - v. equipment and tools
 - vi. identification codes

- b. Procedures for:
 - i. referral of problems
 - ii. reporting delays
 - iii. additional work identified during repair or maintenance
 - iv. keeping others informed of progress

Methods of Communication

- a. verbal
- b. signs and notices
- c. memos
- d. telephone
- e. electronic mail
- f. vehicle job card
- g. notice boards

- h. SMS text messaging
- i. Letters

- a. Organisational & Customer requirements:
 - i. importance of time scales to customer and organization
 - ii. relationship between time and costs
 - iii. meaning of profit

- b. Choice of Communication
 - a. distance
 - b. location
 - c. job responsibility

- c. Importance of maintaining positive working relationships:
 - a. morale
 - b. productivity
 - c. company image
 - d. customer relationships
 - e. colleagues

Assessment Requirements

Unit G4K – Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

Content:

Common types of hand tools used for fabricating and fitting in the automotive workplace.

To include:

- a. files
- b. hacksaws and snips
- c. hammers
- d. screwdrivers
- e. pliers
- f. spanners
- g. sockets
- h. punches
- i. types of drill and drill bits
- j. taps and dies
- k. stud removers
- l. marking out tools

Common measuring devices used for fabrication and fitting in the automotive workplace.

To include:

- a. rule/tape
- b. callipers
- c. feeler gauge
- d. volume measures
- e. micrometer
- f. dial gauges
- g. torque wrenches
- h. depth gauges

Common electrical measuring tools used in the repair of vehicles and components. To include:

- a. ammeter
- b. voltmeter
- c. ohmmeter
- d. multi-meter

Common electrical terms when measuring:

- a. voltage
- b. current
- c. resistance

Workshop equipment (including appropriate PPE). To include:

- a. hydraulic jacks
- b. axle stands
- c. pillar drills
- d. air tools
- e. vehicle lifts
- f. cranes

- g. hoists
- h. electrical power tools

Properties, application and limitations (to include safe use) of ferrous and non-ferrous metals used when constructing, modifying and repairing vehicles and components.

Materials to include:

- a. carbon steels
- b. alloy steels
- c. cast iron
- d. aluminium alloys
- e. brass
- f. copper
- g. lead

Properties, application and limitations (to include safe use) of non-metallic materials used when constructing, modifying and repairing vehicles and components. Materials to include:

- a. glass
- b. plastics (inc. GRP)
- c. Kevlar
- d. rubber

Terms relating to the properties of materials. To include:

- a. hardness
- b. toughness
- c. ductility
- d. elasticity
- e. tenacity
- f. malleability
- g. plasticity

Assessment Requirements

Unit G6K – Knowledge of how to Make Learning Possible through Demonstrations and Instruction

Content:

Separate areas of demonstration which encourage learning. To include:

- a. demonstration is particularly applicable to learning manual skills.
- b. learning to do something usually involves:
 - i. purpose – the aim or objective
 - ii. procedure - the most effective way of completing the task
 - iii. practice – all skills require practice to improve
- c. practical tasks are more quickly learnt through demonstration.
- d. emphasis is required to body movements when demonstrating.
- e. the demonstrator should encourage learners to ask questions.
- f. emphasis should be placed upon key points whilst demonstrating.
- g. any demonstration should ensure that all safety aspects are covered.

Types of learning which are best achieved and supported through demonstrations. To include:

- a. types of learning:
 - i. psychomotor – measurement of manual skill performance
 - ii. cognitive – learning involving thought processes
 - iii. affective – demonstration of feelings, emotions or attitudes
- b. demonstration - involves learning to do something (Psychomotor Domain).
- c. combination of instruction and practical demonstrations are very effective means of learning practical skills.

How to structure demonstration and instruction sessions. To include:

- a. Before the demonstration and/or instruction ensure that the following good practice is recognised:
 - i. identify key points
 - ii. relate theoretical underpinning knowledge to key points
 - iii. rehearse to ensure that all equipment is working
 - iv. ensure all students can see even small equipment and processes
 - v. time the demonstration
 - vi. consider how to make students participate
 - vii. consider how to emphasise safe working practices
- b. During the demonstration and/or instruction good practice is to:
 - i. give a clear introduction
 - ii. identify any tools/equipment
 - iii. determine the current audience level of knowledge
 - iv. complete the demonstration correctly (do not show how not to do it)
 - v. stress key points and show links between them
 - vi. monitor safety aspects
 - vii. check learner understanding
- c. After the demonstration(if possible)
 - i. enable the audience to practice the techniques
 - ii. provide feedback on their performance

How to identify individual learning needs

- a. Diagnose the learning needs of your audience to include:

- i. what competencies they already have
- ii. what experience they have of the subject area
- iii. what competencies they need to achieve
- iv. what demonstration techniques are best suited to their needs
- iv. how you will assess their needs have been met

What factors are likely to prevent learning. To include:

- i. language barriers
- ii. physical barriers
- iii. specialist knowledge
- iv. pace of learning
- v. method of delivery
- vi. environmental factors
- vii. teaching styles
- viii. dyslexia

How to check learners understanding and progress

- a. Questionnaires.
- b. Verbal questioning.
- c. Observation.
- d. Assessment.
- e. Role play.
- f. Projects/assignments.
- g. Multi-choice questions.
- h. Simulation.
- i. Tests.

How to organise information and prepare materials

- a. Identify the course aim.
- b. Identify the subject aim.
- c. Identify the lesson aim.
- d. Complete a lesson plan - plan the teaching.
- e. Identify a series of 'cues' to be used during the lesson.
- f. Logically organise the information.
- g. Use suitable resources and equipment to maximise learning opportunities.
- h. Assess the learners progress and understanding.

Instructional techniques

- a. types of instructional techniques to include:
 - i. lectures
 - ii. handouts
 - iii. team teaching
 - iv. peer teaching
 - v. discussion – individual, group and peer
 - vi. question and answer
 - vii. multimedia
 - viii. seminars
 - ix. case studies
 - x. project/assignments

Environmental factors that effect learning

- a. environmental factors that should be considered before demonstration/instruction to include:
 - i. loud noises
 - ii. bright colours
 - iii. bright lights

- iv. strong smells
- v. atmosphere
- vi. temperature
- vii. classroom seating
- viii. classroom layout
- ix. bright lights

Health and safety factors that affect learning

- a. health and safety factors that should be considered before demonstration/instruction to include:
 - i. assessment of risk and hazards
 - ii. condition of electrical/electronic equipment
 - iii. position of cables and wires
 - iv. safety of equipment used in demonstration/instruction
 - v. condition of classroom equipment/furniture/structure
 - vi. suitable protective clothing/equipment

Analysis of demonstration/instruction

- a. Analysis of demonstration/instruction to include:
 - i. feedback from students
 - ii. feedback from colleagues
 - iii. organisational quality assessment
 - iv. feedback from external organisations
 - v. awarding body requirements

Developments in learning. To include:

- i. multimedia based materials
- ii. web based materials
- iii. interactive materials

How to choose and prepare appropriate materials. To include:

- a. putting information in order
- b. deciding whether the language used is appropriate
- c. type of material i.e. paper and technology based etc.

Assessment Requirements

Unit G8K – Knowledge of how to Identify and Agree Customer Service Needs

Content:

Organisational Requirements

- a. Explain the organisation's terms and conditions applicable to the acceptance of customer vehicles.
- b. Explain the content and limitations of vehicle and component warranties for the vehicles dealt with by your organisation.
- c. Detail what, if any, limits there are to the authority for accepting vehicles.
- d. Detail why it is important to keep customers advised of progress and how this is achieved within the organisation.
- e. Detail the organisation's procedures for the completion and processing of documentation and records, including payment methods and obtaining customer signatures as applicable.

Principles of Customer Communication and Care.

- a. First Impressions.
- b. Listening skills – 80:20 ratio.
- c. Eye contact and smiling.
- d. Showing interest and concern.
- e. Questioning techniques and customer qualification.
- f. Giving clear non-technical explanations.
- g. Confirming understanding (statement/question technique, reflective summary).
- h. Written communication – purpose, content, presentation and style.
- i. Providing a high quality service – fulfilling (ideally exceeding) customer expectations within agreed time frames.
- j. Obtaining customer feedback and corrective actions when dissatisfaction expressed.
- k. Dealing with complaints.

Company Products and Services

- a. Service standards
 - i. national
 - ii. manufacturer
 - iii. organisational
- b. The range and type of services offered by the organisation.
 - i. diagnostic.
 - ii. servicing.
 - iii. repair.
 - iv. warranty.
 - v. MOT testing.
 - vi. fitment of accessories/enhancements.
 - vii. internal.
- c. The courses of action available to resolve customer problems.
 - i. the extent and nature of the work to be undertaken.
 - ii. the terms and conditions of acceptance.
 - iii. the cost.
 - iv. the timescale.
 - v. required payment methods.

- d. The effect of resource availability upon the receipt of customer vehicles and the completion of work.
 - i. levels and availability of equipment.
 - ii. levels and availability of technicians.
 - iii. workshop loading systems.
- e. How to access costing and work completion time information.
 - i. manuals.
 - ii. computer based.

Vehicle Information Systems, Servicing and Repair Requirements

- a. Accessing technical data including diagnostics.
- b. Servicing to manufacturer requirements/standards.
- c. Repair/operating procedures.
- d. MOT standards/requirements.
- e. Quality controls – interim and final.
- f. Requirements for cleanliness of vehicle on return to customer.
- g. Handover procedures.

Consumer Legislation To include:

- a. consumer protection
- b. sale of goods
- c. data protection
- d. product liability
- e. health and safety
- f. discrimination

Assessment Requirements

Unit BP01K – Knowledge of Removing and Fitting Motor Mechanical, Electrical and Trim (MET) Components to Vehicles

Content:

Procedures to prevent damage to the vehicle, components and contents when removing, storing and refitting MET components

- a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage:
 - i. bumpers
 - ii. headlamp units
 - iii. road wheels
 - iv. batteries
 - v. bonnet fittings
 - vi. interior trim components
 - vii. exterior trim components
- b. The procedures for the correct storage of vehicle contents.
- c. The process for the reporting of extra damage and items that may have broken when removed or refitted.

The processes involved when handling batteries

- a. The procedure for the removal, storage and refitting of lead acid batteries.
- b. The procedure for the disposal of lead acid batteries.
- c. Battery checks:
 - i. electrolyte
 - ii. discharge
 - iii. specific gravity
- d. The charging process and procedures:
 - i. trickle charge
 - ii. normal charge
 - iii. boost / start
- e. The health and safety issues involved when charging (explosive gasses).

Types of clips and fixings

- a. The following types of clips and identify reasons and limitations for their use:
 - i. speed
 - ii. 'c'
 - iii. 'd'
 - iv. 'j' type captive nut
 - v. 'r'
 - vi. 'u' type captive nut
 - vii. cable clip
 - viii. trim clips
- b. The following types of fixings and identify reasons and limitations for their use:
 - i. rivets
 - ii. plastic capture nut
 - iii. nut and bolt
 - iv. shoulder bolt
 - v. 'Nyloc' type nuts

- vi. washers
- vii. 'Spring' type washers
- viii. self tapping screws and bolts
- ix. quick release plastic trim fastenings
- x. trim tapes
- xi. adhesives and sealers

The processes involved when carrying out quality checks

- a. Items that may have been 'workshop' soiled and describe processes for rectifying:
 - i. door cards
 - ii. seats
 - iii. carpets
 - iv. boot and bonnet trims
- b. Methods for checking gaps.
- c. The process for checking and aligning headlamps:
 - i. address handling procedures for halogen bulbs
 - ii. address handling and health and safety issues relating to xenon bulbs and systems
- d. Operational checks and rectification methods to include:
 - i. lights
 - ii. washers and wipers
 - iii. SRS systems (checking not rectification)
 - iv. charging system (checking not rectification)
 - v. horn
 - vi. fluid levels
 - vii. interior switches
 - viii. operation of door lock mechanisms

Assessment Requirements

Unit BP02K – Knowledge of Removing and Fitting Non Permanently Fixed Motor Vehicle Body Panels

Content:

Removing and Fitting None Permanently fixed (?) Body Panels

- a. Find, interpret and use sources of information applicable to the removal and fitting of basic non-welded body panels.
- b. Select check and use all the tools and equipment required to remove and fit basic non welded body panels The different types of mechanical fixings for non welded panels and when and why they should be used
- c. The correct procedures and processes for removing and fitting of non welded body panels.
- d. The need for correct alignment of panels and methods to achieve this:
- e. Aperture gaps
- f. Alignment of panel features
- g. Best fit of components to panels

- h. Operation of openings such as doors, tailgates, bonnets etc.
- i. The types of quality control checks that can be used to ensure correct alignment and contour of panels and operation of components to manufacturer's specification.
- j. The method of storing removed panels and the importance of storing them correctly.

Assessment Requirements

Unit BP05K – Knowledge of Removing and Replacing Exterior Motor Vehicle Body Panels Including Permanently Fixed Components

Content:

Selection and use of materials

- a. The properties and different types of materials used in the construction of vehicle bodies
- b. The properties and safe use of body component sealers, adhesives and anti-corrosion materials.
- c. The type of sealants and anti-corrosion materials to use and the manufacturer's recommended methods for their application and thickness.
- d. How to apply sealants and anti-corrosion materials.

Removing and fitting of non welded body panels

- a. How to find, interpret and use sources of information applicable to the removal and fitting of non welded body panels.
- b. How to select, check and use all the tools and equipment required to remove and fit non welded structural body panels, the different types of mechanical fixings for non welded body panels and when and why they should be used
- c. The correct procedures and processes for removing and fitting of non welded body panels.
- d. The need for correct alignment of panels and methods to achieve this:
- e. Aperture gaps
- f. Alignment of panel features
- g. Best fit of components to panels
- h. Operation of openings such as doors, tailgates, bonnets etc.
- i. The types of quality control checks that can be used to ensure correct alignment and contour of panels and operation of components to manufacturer's specification.
- j. The method of storing removed panels and the importance of storing them correctly.

Removal and replacement of welded body panels

- a. Principles of welding.
- b. How to spot and MIG weld vehicle panels.
- c. How to remove spot and MIG welded vehicle panels.
- d. How to interpret and use sources of information relevant to the removal and refitting of non-stressed body panels.
- e. The need for correct alignment of panels and the methods used to achieve this.
- f. The types of quality control checks that can be used to ensure correct alignment and contour of panels and operation of components to manufacturer's specification.
- g. How to work safely avoiding damage to the vehicle and its systems.
- h. The methods of storing removed panels and the importance of storing them correctly.
- i. The removal and replacement procedures for body panels using mechanical fastening, adhesive bonding and welding techniques.
- j. How panel removal and refitting affects the overall body structure of the vehicle. The manufacturers approved methods of working for the removal and replacement of body panels including:
 - resistance spot
 - a. MIG MAG
 - b. MIG braze



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- c. adhesive bonding
- d. laser
- e. laser stitch
- f. mechanical fastening

Assessment Requirements

Unit BP06K – Knowledge of Minor Motor Vehicle Exterior Body Panel Repairs

Content:

Selection and use of tools

The principles governing the selection and use of hand tools for metal finishing and plastic filler repairs. Include:

- a.
 - i. panel beating hammers
 - ii. dolly blocks
 - iii. beating files
 - iv. body spoons
 - v. dual action sanders
- b. How to select the correct tools to carry out reshaping work, including specialist dent removal tools including:
 - i. panel pullers
- c. How to prepare, test and use and maintain the hand and power tools required to prepare damage and reshape damaged areas.

Selection and use of materials

- a. How to mix and apply plastic fillers.
- b. The properties and use of metals used to manufacture body panels.
- c. The properties and safe use of types of filling materials used to repair panels including:
 - i. plastic fillers
- d. The different types and grades of abrasive and their use.

The techniques to identify the type of plastics used for manufactured components

Repairing body panels

- a. How to interpret and use sources of information relevant to the removal of body components.
- b. How to prepare damaged areas to facilitate repairs.
- c. How to repair plastic components using thermal and adhesive techniques
- d. How to rough out and metal finish body panels.
- e. How to reshape filling materials to match the original panel contour.
- f. How to finish repairs to a suitable condition for handing on to the painting stage.
- g. How to work safely avoiding damage to the vehicle and its systems.
- h. The techniques for reshaping damaged body panels using hand and specialist tools.
- i. The procedures for reinstating anti-corrosion, sealant and sound deadening materials.
- j. The procedures for repairing damage to plastic components.
- k. The techniques and processes for:
 - i. plastic repairs
 - ii. hot shrinking
 - iii. panel pulling
 - iv. metal finishing

- v. plastic filing
- vi. indirect hammering
- vii. direct hammering
- l. The techniques used to regain the contours of repaired plastic components.
- m. Methods of checking reshaped panel contours for accuracy.
- n. Standards of finish require to enable the next stage of repairs to proceed.
- o. The manufacturer's approved methods of working for the preparation and repair of body panels

Assessment Requirements

Unit BP13K – Knowledge of Removing and Replacing Structural Motor Vehicle Body Panels

Content:

Selection and use of tools and equipment

- a. How to prepare, test and use the tools and equipment required for the removal and replacement of vehicle body panels and ancillary fittings.
- b. How to operate spot welding and gas shielded arc-welding equipment to achieve welds to the current industry standard.

Selection and use of materials

- a. The properties of sealants, adhesives and anti-corrosion materials and the requirement for their safe use.
- b. The type of sealants and anti corrosion materials to use and the manufacturer's recommended methods of their application and thickness.
- c. How to use adhesive bonding materials.
- d. How to select and apply sealants and anti-corrosion materials.
- e. The properties and different types of materials used in the construction of vehicle bodies

Removing and replacing vehicle body panels

- a. The principles governing how unitary and separate chassis vehicle bodies are constructed.
- b. How to identify and remove spot and gas shielded arc welds to meet manufacturers and current Industry Standards.
- c. How to identify the difference between manufacturer's processes and repair processes.
- d. The principles of resistance spot welding, gas shielded arc plug welding, gas shielded arc welding and gas shielded brazing.
- e. Correct procedures for the removal and replacement of vehicle body panels.
- f. The manufacturers approved methods of working for the removal and replacement of vehicle body panels.
- g. The different types of mechanical fixings for vehicle body panels and when and why they should be used.
- h. The repair and welding implications of working with:
 - i. high strength steels (HSS)
 - ii. low carbon steels (LCS)
 - iii. aluminium alloys
 - iv. galvanized coatings
 - v. Boron steels.
 - vi. TRIP
 - vii. TWIP
 - viii. Laminated
- i. How panel removal and refitting affects the overall body structure of the vehicle.
- j. The cause and rectification of distortion resulting from welding.
- k. How to find, interpret and use sources of information relevant to the removal and replacement of vehicle body panels and assemblies.
- l. How to remove and replace vehicle body panels and assemblies.
- m. How to remove and replace door skins.
- n. How to establish cut lines for partial panel replacement.
- o. How to prepare all edges to be joined.
- p. How to select the correct joints and joining process to match the repair area.
- q. The importance and implications of panel clamping and alignment to match existing contours and gaps.

- r. How to test spot weld strength.
- s. How to load a vehicle onto a jig system to ensure correct alignment and positioning of new panels.
- t. How to remove and replace supplementary restraint systems (SRS) using the manufacturers approved method.
- u. How to work safely avoiding damage to the vehicle and its systems.
- v. The importance and implications of checking accuracy of repair work.
- w. The types of quality control checks that can be used to ensure correct alignment and contour of panels and the operation of components to manufacturer's specification.
- x. The method of storing removed panels and the importance of storing them correctly.

Assessment Requirements

Unit BP14K – Knowledge of Motor Vehicle Body Panel Major Repairs

Content:

Selection and use of tools and equipment

- a. The principle governing the selection and use of hand tools for metal finishing and plastic repairs.
- b. The factors governing the selection and use of panel beating and hydraulic reforming equipment, including specialist pulling systems.
- c. How to prepare, test, use and maintain the tools and equipment required to repair vehicle body panels.
- d. How to adapt hydraulic push equipment to perform pulling operations.

Selection and use of materials

- a. The types and selection of filling materials, their preparation and application:
- b. The properties, types, grades and use of abrasives used in vehicle body panel repair process
- c. The properties and safe use of types of filling materials used to repair panels including:
 - i. plastic fillers
 - ii. body solder
- d. How to mix and apply plastic fillers.

Repairing vehicle bodies

- a. How to prepare the vehicle to avoid contamination.
- b. How to assess the extent of damage, including corrosion damage.
- c. How unitary vehicle bodies and cabs are constructed.
- d. The principles of resistance spot welding, gas shielded arc plug welding and gas shielded arc brazing.
- e. How body panels and component damage can affect other panels and the operation of vehicle systems.
- f. The factors determining the use of specific preparation and repair methods.
- g. The repair and welding implications of working with:
 - i. high strength steels (HSS)
 - ii. low carbon steels (LCS)
 - iii. aluminium alloys
 - iv. galvanized coatings
 - v. Boron steels.
 - ix. TRIP
 - x. TWIP
 - xi. Laminated
- h. The consequences of using inappropriate repair methods.
- i. How heat can be used to assist reforming.
- j. How heating can affect the properties of steels.
- k. The techniques for identifying the type of plastics used for manufactured components.
- l. The procedures for reinstating anti-corrosion, sealant and sound deadening materials.
- m. The causes and rectification and distortion resulting from welding.
- n. The manufacturers approved methods of working for the preparation and repair of vehicle body panels.
- o. The specification of panel shapes, dimensions and tolerances for the vehicle worked on.
- p. The type of quality control checks that can be used to ensure the correct contour and standard of finish.

- q. How to interpret and use sources of information relevant to the repair of vehicle body panels and components.
- r. How to prepare damaged areas to facilitate repairs.
- s. How to repair corrosion damaged panels.
- t. How to remove protective materials.
- u. How to repair and reinstate vehicle body panel contours and components using:
 - i. body filling operations
 - ii. metal finishing
 - iii. plastic filling
 - iv. panel beating
 - v. panel shrinking
 - vi. hydraulic reforming
 - vii. specialist dent removal tools
 - viii. spot welding
 - ix. gas shielded arc welding
 - x. gas shielded arc brazing.
- v. The techniques of reshaping damaged vehicle body panels using hand and specialist tools.
- w. How to check the accuracy of reinstated vehicle body panel shapes.
- x. How to finish repairs to a suitable condition for handing on to the painting stage.
- y. How to work safely avoiding damage to the vehicle and its systems.

Additional Content

Repairs are: -

- a. correction of severely distorted panels
- b. assessing panel damage
- c. splits on metal panels, using relevant joining techniques
- d. fractures on plastic panels

Vehicle panels are: -

- a. non-permanently fixed exterior panels
- b. permanently fixed exterior panels
- c. sub-structure components
 - i. bonded panel
 - ii. TRIP
 - iii. TWI
 - iv. Laminated

Assessment Requirements

Unit BP17K – Knowledge of Identifying and Rectifying Motor Vehicle Body Misalignment

Content:

Selection and use of tools and equipment

- a. The constraints the type of vehicle places on the choice of repair equipment.
- b. How to prepare, test and adjust all equipment required for misalignment rectification.
- c. How to install vehicles on misalignment rectification equipment, including the use of lifting equipment.
- d. How to use rectification equipment including:
 - i. hand and power tools
 - ii. safety chains
 - iii. hydraulic push and pull
 - iv. body jigs (bracket system and/or measuring system)
- e. The correct use of clamps, restraints and supports to minimise additional damage during repair.

Realignment of vehicles

- a. The principle of chassis frame and monocoque vehicle construction.
- b. The principle of damage assessment and identification of direct and indirect damage.
- c. The function of the pulling system and the criteria for selection:
 - i. Vector
 - ii. pull arm
 - iii. tower system
 - iv. floor mounted
 - v. bench mounted.
- d. How to use geometric principles of alignment in the absence of data sheets.
- e. The properties of vehicle body construction materials.
- f. How to find, interpret and use sources of information relevant to the rectification of vehicle misalignment.
- g. How to establish the extent of misalignment using measuring equipment and/or measuring system.
- h. How to realign vehicles to the manufacturers' original specification.
- i. How to work safely avoiding damage to vehicles, personal injury and injury to colleagues.
- j. The importance of following manufacturers' instructions and using their approved methods of working (including use of materials and equipment).
- k. The consequences of failing to follow manufacturers' instructions and data sheets.

Rectification activities are: -

- a. Visual examination
- b. Setting up
- c. Measurement in conjunction with alignment measuring equipment
- d. Realignment using pulling equipment

Assessment Requirements

Unit BP19K – Knowledge of Motor Vehicle Body Metal Active Gas Shielding (MAGS) Welding Techniques

Content:

- a The safe working practices and procedures to be observed when working with , MAGS or cored wire arc welding equipment (general workshop and site safety; appropriate personal protective equipment; fire prevention; protecting other workers from the effects of the welding arc; safety in enclosed/confined
- b spaces; fume control; accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- c The correct handling and storage of gas cylinders (manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features, emergency shutdown procedures)
- d The hazards associated with arc welding (live electrical components; current return (earth return); the electric arc; fumes and gases; gas supply leaks; spatter, hot slag and metal; elevated working; enclosed spaces; slips, trips and falls), and how they can be minimised
- e The manual , MAGS or cored wire arc welding process (principles of fusion welding, AC and DC power sources, ancillary equipment, power ranges, care of equipment)
- f The consumables associated with , MAGS or cored wire arc welding (types of wire and their application (solid and cored), types of shielding gas and their application, gas supply and control)
- g The types of welded joints to be produced (fillet and butt welds, single and multi-run welds, sheet and sections; welding positions)
- h Setting up and restraining the joint (the use of jigs and fixtures, manipulators and positioners, restraining devices, tack welding size and spacing in relationship to material thickness)
- i Preparing the welding equipment and checks that need to be made to ensure that it is safe and ready to use (electrical connections, power return and current return (earth return); wire feed mechanisms, gas supply, setting welding parameters, correct joint set-up, cleanliness of materials used; calibration before use; routine care and maintenance of equipment)
- j The techniques of operating the welding equipment to produce a range of joints in the various joint positions (fine tuning parameters, correct manipulation of the welding gun, safe closing down of the welding equipment)
- k The importance of complying with job instructions and the welding procedure specification
- l Problems that can occur with the welding activities and how these can be overcome (causes of distortion and methods of control, effects of welding on materials and sources of weld defects; methods of prevention)



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- m The importance and usage of organisational quality systems used and weld standards to be achieved; weld inspection and test procedures used (including visual and non-destructive tests)
- n Personal approval tests, and their applicability to your work
- o The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- p Reporting lines and procedures, line supervision and technical experts

Assessment Requirements

Unit BP20K – Knowledge of Motor Vehicle Body Resistance Spot Welding Operations

Content:

- a The specific safety precautions to be taken when operating resistance welding installations (working with machinery; the use of appropriate personal protective equipment machine guards; operation of machine safety devices; stopping the machine in an emergency; closing down the machine on completion of the welding activities; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials), any regulations relating to EMF (Electric Magnetic Field)
- b The hazards associated with resistance welding machines (dangers from live internal electrical components, fumes, hot metal, expulsion of hot particles, moving parts of machines), and how they can be minimised
- c The principles of resistance welding; terminology used in welding
- d Mechanised and automated welding s (types of installation; machine functions; control systems; safety features)
- e The key components and features of the equipment used (power source; electrical parameters such as arc voltage, current, electrode pressure and welding time; systems for parameter control; how variation in the parameters influence weld features, quality and output)
- f Extracting the information required from drawings and welding procedure specifications
- g Operation of the machine controls and their function; clamping of components and equipment care procedures
- h Setting up and aligning the work piece
- i Monitoring the the welding process; recognition of problems, and action to be taken
- j Problems that can occur with the welding activities, materials and weld defects
- k Self inspection of completed work
- l Organisational quality systems (standards to be achieved; production records to be kept)
- m Personal approval tests and their applicability to your work
- n The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- o Reporting lines and procedures, line supervision and technical experts
- p The requirements of the power supply to the unit and the use of extension cables

Assessment Requirements

Unit BP21K – Knowledge of Motor Vehicle Body Metal Inert Gas (MIG) Brazing Operations

Content:

- a The safe working practices and procedures to be observed when operating brazing installations (working with machinery; the use of appropriate personal protective equipment; machine guards; operation of machine safety devices; stopping the machine in an emergency; closing the machine down on completion of activities; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- b The hazards associated with MIG brazing machines (dangers from relevant equipment sources; fumes and gases; hot metal; moving parts of machinery), and how they can be minimised
- c Principles of the relevant brazing process; terminology used in brazing
- d The key components and features of the equipment
- e How to extract the information required from drawings and brazing procedure specifications
- f Operation of the machine controls and their function; care of equipment; control and storage of consumables
- g Setting up and aligning the work pieces
- h Monitoring the installation during the brazing process; recognition of problems, and action to be taken
- i Problems that can occur with the brazing activities, materials, filler metals and joint defects
- j Self inspection of completed work
- k Organisational quality systems (standards to be achieved; production records to be kept)
- l Personal approval tests and their applicability to your work
- m The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- n Reporting lines and procedures, line supervision and technical experts

Assessment Requirements

Unit BP22K – Knowledge of Motor Vehicle Body Aluminium MIG Operations

Content:

- a The safe working practices and procedures to be observed when working with aluminium welding equipment (general workshop and site safety; appropriate personal protective equipment; fire prevention; protecting other
- b Workers from the effects of the electric arc; safety in enclosed/confined spaces; fume control; accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- c The hazards associated with aluminium welding (live electrical components; current return (earth return)arrangements; the electric arc; fumes and gases; gas supply leaks; spatter; hot slag and metal; grinding and mechanical metal/slag removal; elevated working; enclosed spaces; slips, trips and falls), and how they can be minimised
- d The correct handling and storage of gas cylinders (manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features, emergency shutdown procedures)
- e The manual MIG welding process (principles of fusion welding; power sources; ancillary equipment; power ranges; arc initiation system; care and maintenance of equipment)
- f The consumables associated with MIG welding (types of filler wire, types of shielding gas, welding electrodes, gas supply and control, control and storage of consumables)
- g The types of welded joints to be produced (fillet and butt welds, single and multi-run welds, sheet and sections; welding positions)
- h Setting up and restraining the joint (confirming correct set-up of joint; cleanliness of materials used; the use of jigs and fixtures, manipulators and positioners, restraining devices; tack welding size and spacing in relationship to material thickness)
- i Preparing the equipment, and checks that need to be made to ensure that it is safe to use (condition of electrical connections, power return and current return (earth return)arrangements, operating parameters)
- j The techniques of operating the welding equipment to produce a range of joints in the various joint positions (fine tuning parameters, correct manipulation of torch, safe closing down of the welding equipment)
- k The importance of complying with job instructions and the welding procedure specification
- l Problems that can occur with the welding activities and how these can be overcome (causes of distortion and methods of control, effects of welding on materials and sources of weld defects; methods of prevention)
- m The organisational quality systems used and weld standards to be achieved; weld inspection and test procedures used (including visual and non-destructive tests)
- n Personal approval tests and their applicability to your work
- o The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- p Reporting lines and procedures, line supervision and technical experts

Assessment Requirements

Unit BP23K – Knowledge of Motor Vehicle Body Tungsten Inert Gas (TIG) Welding Operations

Content:

- a. The safe working practices and procedures to be observed when working with TIG or Plasma-arc welding equipment (general workshop and site safety; appropriate personal protective equipment; fire prevention; protecting other workers from the effects of the electric arc; safety in enclosed/confined spaces; fume control; accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- b. The hazards associated with arc welding (live electrical components; current return (earth return); the electric arc; fumes and gases; gas supply leaks; spatter; hot slag and metal; grinding and mechanical metal/slag removal; elevated working; enclosed spaces; slips, trips and falls), and how they can be minimised
- c. The correct handling and storage of gas cylinders (manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features, emergency shutdown procedures)
- d. The manual TIG or Plasma-arc welding process (principles of fusion welding; power sources; ancillary equipment; power ranges; arc initiation system; care and maintenance of equipment)
- e. The consumables associated with TIG or Plasma-arc welding (types of filler wire, types of shielding gas, welding electrodes, gas supply and control, control and storage of consumables)
- f. The types of welded joints to be produced (fillet and butt welds, single and multi-run welds, sheet and sections; welding positions)
- g. Setting up and restraining the joint (confirming correct set-up of joint; cleanliness of materials used; the use of jigs and fixtures, manipulators and positioners, restraining devices; tack welding size and spacing in relationship to material thickness)
- h. Preparing the equipment, and checks that need to be made to ensure that it is safe to use (condition of electrical connections, power return and earthing arrangements, operating parameters)
- i. The techniques of operating the welding equipment to produce a range of joints in the various joint positions (fine tuning parameters, correct manipulation of torch, safe closing down of the welding equipment)
- j. The importance of complying with job instructions and the welding procedure specification
- k. Problems that can occur with the welding activities and how these can be overcome (causes of distortion and methods of control, effects of welding on materials and sources of weld defects; methods of prevention)



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- l. The organisational quality systems used and weld standards to be achieved; weld inspection and test procedures used (including visual and non-destructive tests)
- m. Personal approval tests and their applicability to your work
- n. The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- o. Reporting lines and procedures, line supervision and technical experts

Assessment Requirements

Unit BP24K – Knowledge of Motor Vehicle Body Mechanical Fastening Operations

Content:

- a. The hazards associated with the joining operations (such as handling sheet/fabricated components, using hot metal riveting techniques, handling and using sealants and cleaning agents, dangerous or badly maintained tools and equipment), and how they can be minimised
- b. How to obtain the necessary drawings and joining procedure specifications
- c. How to extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards in relation to work undertaken)
- d. The use of manufacturers' specifications for the types of fasteners used
- e. The various joining processes that are used, and the tools and equipment required
- f. The preparations to be carried out on the materials/components prior to joining them (such as materials to be degreased, dry and clean, with holes and flanges de-burred)
- g. How to set up and align the joints prior to fixing, and the tools and methods that can be used (such as clamps, rivet gripping tools, temporary fixings, jacking and supporting devices)
- h. How to produce a secure joint using blind rivets, and the type of riveting tools that are available
- i. The range of bolts and screwed fasteners that are to be used; why it is important to use the correct type of washer; sequence of tightening bolts on flanged joints; and the tools and equipment used to ensure they are tightened to the required torque
- j. Checks to be carried out on the tools and equipment prior to use to ensure that they are in a safe and usable condition (such as condition of plugs and leads on power tools, condition of striking faces on hammers, condition of riveting tools)
- k. Equipment setting, operating and care procedures; why equipment and tools need to be correctly set up and in good condition
- l. The importance of using the tools only for the purpose intended; the care that is required when using the equipment and tools; the proper way of preserving and storing tools and equipment between operations
- m. The things that can go wrong with the joining operations, and how these can be avoided
- n. The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- o. Reporting lines and procedures, line supervision and technical experts

Assessment Requirements

Unit BP25K – Knowledge of Motor Vehicle Body Adhesive Bonding Operations

Content:

- a. The specific safety precautions to be taken when bonding engineering materials using adhesives in a fabrication environment (general workshop and site safety, appropriate personal protective equipment, accident procedure; statutory regulations, risk assessment procedures and COSHH regulations)
- b. The personal protective clothing and equipment to be worn when carrying out bonding as part of the fabrication activities (gloves, eye protection,, respiratory protection, etc)
- c. The importance of good workshop practice and housekeeping, ventilation and fume control equipment, first aid procedures and actions, hazardous substances and relevant sections of COSHH
- d. The hazards associated with bonding fabricated components, and how they can be minimised
- e. How to obtain the necessary drawings and joining specifications
- f. How to extract information from research repair methodology in relation to the work undertaken

Types of adhesives:

compact
two parts
cyanoacrylate
anerobic
sealants
toughened

- g. Knowledge of Curing Mechanisms including:

moisture/solvent evaporation
chemical/thermal reaction
exposure/exclusion to oxygen
Understanding the importance of recording shelf life, pot life, setting and curing times
Knowledge of adhesion and cohesion.

Understanding:

- h. The material preparations that are required, and the equipment and consumables that are used
- i. The importance of working to organisational and bonding agent manufacturers' instructions whilst carrying out the bonding activities

- j. The methods and techniques used for bonding the materials (such as gluing, impact, chemical and thermal reaction techniques)
- k. The characteristics of the adhesives that are to be used
- l. The application of, and precautions to be taken when using, adhesives and solvents
- m. Maintenance and care of tools and equipment
- n. Methods of degreasing components and producing a keying surface
- o. Type and suitability of adhesives, setting or curing requirements and time, strength and appearance
- p. Common causes of defects associated with the bonding processes, and how to avoid them
- q. The effects of the environment on the bonding process (such as temperature humidity, cleanliness)
- r. How to identify, select, use, and clean, the appropriate bonding agent holding vessels, brushes, stirrers and spatulas, scrapers, knives, clamps and weights
- s. The importance of cleaning up after use, to ensure everything can be used again and to minimise the need for replacement of equipment
- t. Reasons for checking that components are assembled in the correct sequence, are positioned dimensionally accurately and to the correct orientation, in accordance with the specifications, prior to bonding
- u. How to check that completed joints are firm, sound and fit for purpose
- v. Procedures for cleaning off surplus adhesive and tidying up the appearance of joints
- w. The extent of your own authority and whom you should report to if you have problems that you cannot resolve
- x. Reporting lines and procedures, line supervision and technical experts

Assessment Requirements

Unit BP26K – Knowledge of Motor Vehicle Construction and Materials

Content:

Common forms in which body repair materials are supplied

- a. Identify the common forms of supply of metals to include:
 - i. sheet
 - ii. roll
 - iii. bar
 - iv. section
- b. Identify common forms of supply for non metals:
 - i. solid
 - ii. liquid
 - iii. composites
 - iv. laminated

Mechanical properties and use examples of materials to illustrate these properties

- a. Define the three states of matter.
- b. State the definitions of the following mechanical properties:
 - i. ductility
 - ii. malleability
 - iii. hardness
 - iv. toughness
 - v. elasticity
 - vi. plasticity
 - vii. weld ability
 - viii. conductivity
 - ix. insulation
- c. Give examples of materials and components exhibiting the above properties.
- d. Describe ways in which the above properties can be changed temporarily or permanently to include:
 - i. heating
 - ii. alloying
 - iii. cold working
 - iv. heat treatments

Define and distinguish between classes of materials

- a. Define classes of materials as:
 - i. metals
 - ii. non metals
 - iii. synthetic
 - iv. natural
- b. Classify metals into:
 - i. ferrous
 - ii. non ferrous
 - iii. pure metals
 - iv. alloys

Factors which affect the selection of listed materials

- a. Identify the range of selection factors which determine the use of materials to include:
 - i. material costs

- ii. suitability for use
- iii. form of supply
- iv. joining characteristics
- v. strength
- vi. material properties
- vii. corrosion resistance
- viii. melting point
- b. Compare the factors affecting the use of:
 - i. pure metals
 - ii. alloys
 - iii. plastics
- c. Understand the Importance of melting points of the following:
 - i. LC steel
 - ii. aluminium alloy
 - iii. stainless steel
 - iv. solder
 - v. common plastics

Listed materials used in repair or construction

- a. Identify the types and properties of steels used in construction and repair to include:
 - i. low carbon steels
 - ii. medium carbon steels
 - iii. high carbon steels
 - iv. cast irons
 - v. alloy steels
 - vi. UHSS
- b. Describe the properties of common non ferrous metals used in construction and repair to include:
 - i. aluminium
 - ii. zinc
 - iii. lead
 - iv. tin
 - v. copper
- c. Compare and identify listed non-metals used in repair or construction to include:
 - i. plastics
 - ii. glass
 - iii. fabrics
 - iv. leather
 - v. rubber
- d. Define the terms:
 - i. thermo plastic
 - ii. thermo setting plastics
- e. Identify the uses and properties of materials used for interior furnishings such as:
 - i. rubber
 - ii. fabric
 - iii. leather
 - iv. glass
- f. Give examples of common plastics used in repair and construction including:
 - i. ABS
 - ii. polyethylene
 - iii. polypropylene
 - iv. polyester
 - v. acrylic
 - vi. glass reinforced plastic

State the constituents and general properties of the following alloys:

- i. solder
- ii. stainless steel
- iii. low carbon steel
- iv. brass
- v. aluminium alloys including duralumin

Ways in which the properties of metals can be changed temporarily or permanently

- a. Explain the advantages of changing the material properties temporarily
- b. Explain the effects of changing the material properties permanently
- c. State the advantages of changing materials properties
- d. State that material properties can be changed by:
 - i. heat treatment
 - ii. cold working
 - iii. alloying
- e. Describe how the properties of metals are changed under the above three headings

Causes of corrosion in steel car bodies

- a. Explain the principle of oxidation to include:
 - i. simple corrosion cell
 - ii. combination with oxygen
 - iii. effects of an electrolyte
 - iv. effects of dissimilar metals
- b. Identify reasons for corrosion in vehicles to include:
 - i. bad joint design
 - ii. poor protection
 - iii. stone chips
 - iv. water leaks
 - v. industrial pollution
- c. Explain that methods of corrosion protection can include:
 - i. protective metal coatings
 - ii. protective non-metal coatings
 - iii. cavity waxes
 - iv. anti chip coatings
 - v. sealers
- d. Describe the effects of corrosion in a vehicle body to include:
 - i. loss of strength
 - ii. manufacturers warranty consideration
 - iii. loss of appearance

Characteristics of body assemblies

- a. Describe methods of producing body panels to include:
 - i. forming
 - ii. pressing
 - iii. moulding
- b. Describe the methods of imparting strength to sheet metal to include:
 - i. swages
 - ii. edging
 - iii. forming into sections
 - iv. combining sections into box sections
 - v. the principles of crowned panels
- c. Describe the characteristics of monocoque structures.
- d. Describe the characteristics of separate construction.
- e. Identify by name and description of use, the following:
 - i. sill panel

- ii. bulkhead
- iii. chassis leg
- iv. inner flitch
- v. cross member
- vi. a, b, c and d posts
- vii. roof
- viii. cant rail
- ix. windscreen header rails
- x. floor assembly
- xi. inner wheel arches
- xii. dog leg
- xiii. scuttle panels
- xiv. front panel
- xv. headlamp mounting panels
- xvi. back panel